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By: Dr. Renu Gambhir



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**Sample Preview
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QUESTION PAPER

June – 2023

(Solved)

RESEARCH METHODOLOGY AND STATISTICAL ANALYSIS

M.C.O.-3

Time: 3 Hours]

[Maximum Marks: 100

Note: Attempt any five questions. All questions carry equal marks.

Q. 1. (a) What is research problem? Discuss the main issues which should receive the attention of the researcher in formulating the research problem.

Ans. Ref.: See Chapter-2, Page No. 12, Q. No. 15.

Also Add: Without a problem, research cannot proceed, because there is nothing to proceed from and proceed towards. Therefore, the first step in research is to perceive a problem - either practical or theoretical. The recognition or existence of a problem motivates research. A well defined research problem is half solved. It may be noted that research is the process of repeated search for truth/facts. Unless there is a problem to search for, investigation cannot proceed. Thus, a problem sets the goal or direction of research. A problem in simple words is “some difficulty experienced by the researcher in a theoretical or practical situation. Solving this difficulty is the task of research”. A problem exists when we do not have enough information to answer a question (problem). The answer to the question or problem is what is sought in the research. By problem we mean “any condition or circumstance in which one does not know how to act and what to accept as true”. In our common usage when we are unable to assess a thing correctly, we often say ‘it is problematic’. Thus, the researcher who selects a problem formulates a hypothesis or postulates a theoretical assumption that this or that is true, this or that thing to do. He/she collects proof (facts/data) of his/her hypothesis. Based on the analysis of the data collected he/she asserts the truth or answers the question/solves the problem. The problem for research should ordinarily be expressed in an interrogative form. For example :

- Why is product X more popular than product Y?
- How to increase labour productivity?
- Does illumination increase productivity?
- Why is factory A earning profits and factory B incurring losses?
- Is the audio-visual system of teaching more effective than the audio system?

These are all searchable problems/questions. Finding answers to the problems is what is endeavoured in research. One question/problem may give rise to number of/series of sub-questions too. A topic of study may be selected by some institution or by some researcher or researchers having intellectual interests. In the former case there could be a wide variety of problems in which institutions are interested. The institution could be a local body, or government or corporate enterprises or a political party. For example, the government may be interested in assessing the probable consequences of various courses of action for solving a problem say rural unemployment. A firm may be interested in assessing the demand for something and predicting the future course of events so as to plan appropriate action relating to marketing, production, consumer behaviour and so on. The topic of study may be selected by some individual researcher having intellectual or scientific interests. The researcher may be interested in exploring some general subject-matter about which relatively little is known. And its purpose is just for scientific curiosity. Person may also be interested in a phenomenon which has already been studied in the past, but now it appears that conditions are different and, therefore, it requires further examination. Person may also be interested in a field in which there is a highly developed theoretical system but there is need for retesting the old theory on the

basis of new facts, so as to test its validity in the changed circumstances.

(b) What is meant by interpretation of statistical data? What precautions should be taken while interpreting the data?

Ans. Ref.: See Chapter-18, Page No. 200, Q. No. 10.

Q. 2. The scores for nine students in Physics and Mathematics are the follows:

Physics marks	Mathematics marks
35	30
23	33
47	45
17	23
10	8
43	49
9	12
6	4
28	21

Compute the Spearman's rank correlation by assigning the ranks and interpret the result.

Ans.

Physics	Rank R_1	Mathematics	Rank R_2	$D=R_2-R_1$	D^2
35	7	30	5	-2	4
23	5	33	7	2	4
47	9	45	8	-1	1
17	4	23	4	0	0
10	3	8	2	-1	1
43	8	49	9	1	1
9	2	12	3	1	1
6	1	4	1	0	0
28	6	31	6	0	0
					ΣD^2 =12

$$\begin{aligned}
 R &= 1 - \frac{6\Sigma D^2}{N^3 - N} \\
 &= 1 - \frac{6 \times 12}{9^3 - 9} \\
 &= 1 - \frac{72}{720} \\
 &= 1 - \frac{1}{10} \\
 &= \frac{9}{10} = 0.9
 \end{aligned}$$

Since the value is positive, then there is exist an agreement in the order of rank and the direction of the rank is also the same.

Q. 3. Discuss the method of random sampling. Distinguish between cluster sampling and stratified sampling.

Ans. Ref.: See Chapter-4, Page No. 25, Q. No. 2, Page No. 26, Q. No. 4 and Page No. 27, Q. No. 7.

Q. 4. (a) Discuss the types of formulation of hypotheses in business research.

Ans. Ref.: See Chapter-2, Page No. 12, Q. No. 20.

(b) Describe the methods of analysis which will be applied to the data in determining whether the hypotheses are true or false.

Ans. Ref.: See Chapter-15, Page No. 158, 'Test of Hypothesis'.

Q. 5. (a) Explain the types of probability distribution and give their usefulness in research.

Ans. Ref.: See Chapter-14, Page No. 140-141, 'Introduction'.

(b) What is meant by statistical fallacy? What dangers and fallacies are associated with the use of statistics?

Ans. Statistical fallacies occur due to inadequate sample that is used for generalized conclusion; incomparable groups presented as comparable; mixing of two or more distinct groups that in fact require separate consideration; misuse of percentages, means and graphs; incomplete reporting that suppresses facts; ignoring reality and depending instead on oversimplification; forgetting baseline values that affect the outcome; misuse of computer packages and use of black box approach; misuse of P-values that compromises conclusions; confusing correlation with cause-effect; and interpreting statistical significance as medical significance.

Dangers associated with the use of statistics:

- Quoting statistics based on non-representative samples.
- Choosing the "average" value for a sample which most lends itself to your position, when a different "average" value would be more appropriate.
- Speaking of changes in a variable in terms of actual values or percentages to either inflate or deflate their importance psychologically.
- Using detached statistics like "1/3 fewer carbs" (fewer than what?)
- Implying causal connections between variables without a well-designed experiment to back it

Sample Preview of The Chapter

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RESEARCH METHODOLOGY AND STATISTICAL ANALYSIS

RESEARCH AND DATA COLLECTION

Introduction to Business Research



MEANING OF RESEARCH

There are accepted truth and theories in all fields of knowledge. The theories with differing level of generality and degree of conformation existing at a given point of time are known to all. The intellectual of the society are always inclined to probe for facts of the empirical world and confirm the proved truth of his investigations by accepting or correcting the existing theories. Such probing is called research. All research is the collection of evidence or information for ascertaining an assumption or verifying some hypothesis. Thus, research is a systematic attempt to push back the bonds of comprehension and seek beyond the horizon of our knowledge, some 'truth' or some 'reality'.

OBJECTIVES OF RESEARCH

The purpose of research is to discover answers to questions through the application of scientific procedures. The objective of research are varied. They are:

1. Research extends the knowledge of human-beings, social life and environment, scientist and researchers build up the wealth of knowledge through research findings.

2. Research unravels the mysteries of nature; bring to light hidden information that might never be discovered fully during the ordinary course of life.
3. General laws develop through research may enables us to make reliable predictions of events yet to happen.
4. Applied research aims at finding solutions to problems—socio-economical problems, health problems, human relation problems in organization and so on.
5. Research also aims at developing new tools, concepts and theories for a better study of unknown phenomena.
6. Research aid planning and, thus, contributes to national development.

Data

Data are defined as 'facts', figures etc. known or are available information. Data are more than, facts, figures, more than information, events or experiences, more than memories of a teller of life history. Data are all the relevant materials, past and present, serving as basis for study and analysis.

Scientific Method

Research is a scientific endeavour. It involves scientific method. The scientific method involves the logical process of reasoning. The logical reasoning process consists of induction and deduction.

Induction

This method consists of studying several individual cases and drawing a generalization. This method is followed when new facts are studied, new truths are uncovered and new generalizations are formulated from a research project.

Deduction

Deduction is reasoning process of applying a general accepted principles to a specific individual case falling under the general principles. The deduction method is useful for solving problems. But this is not useful in arriving at new truths.

Types of Research

The basic types of research are as follows:

1. Descriptive vs. Analytical.
2. Applied vs. Fundamental
3. Quantitative vs. Qualitative
4. Conceptual vs. Empirical
5. Some other types of Research.

Methods of Research

1. Survey Method
2. Case Method
3. Experimental Method
4. Historical Method
5. Comparative Method.

TEXTUAL QUESTIONS

Q. 1. What do you understand by Research?

Ans. Research in a layman terminology refers to a search for knowledge. One can also define research as a scientific and systematic research for pertinent information on a specific topic *i.e.*, research is an art of scientific investigation.

Research is an academic activity and as such the term should be used in a technical senses. Then the term 'research' refers to the systematic methods consisting of enunciating the problem, formulating a hypothesis, collecting the facts or data, analyzing the facts and researching certain conclusion either in the form of solution(s) towards the concerned problem or in certain generalisation for some theoretical formulation.

Research is, thus, an original contribution to the existing stock of knowledge for its advancement.

Q. 2. What do you mean by Science?

Ans. Webster's dictionary defines Science as a "accumulated and accepted knowledge that has been systematized and formulated with reference to the discovery of generally truths or the operation of general law." Science is a body of systematized knowledge. It studies cause and effect and tries to find out generalizations which are called law of that science. It does not tell whether the results are good or bad. It only describes what are the facts. It is like a light house that gives light to the ships to find out their own ways but does not indicate in which direction they should go. The ships have to find their own direction with the help of the light.

Q. 3. What is knowledge?

Ans. Knowledge means the state of knowing about a particular fact or situations. Curiosity or inquisitiveness is a distinctive feature of human beings curiosity to know about ourselves, our institutions, our environment, our planets and the universe is inherent in us.

Human knowledge takes the form of belief or judgement about a particular phenomenon. The beliefs which are supported by evidence are called knowledge.

Q. 4. What is inductive logic?

Ans. Induction is one of the methods of logical reasoning process. The inductive method consists of studying several individual cases and drawing a generalization. Therefore, induction involves two processes—observation and generalization. Conclusions from induction are tentative inferences and they are subject to further confirmation based on more evidences.

This method is followed when new facts are studied, new truths are uncovered and new generalizations are formulated from a research project.

Q. 5. What is meant by deduction?

Ans. Deduction is reasoning process of applying a general principle to a specific individual case falling under the general principle. It is regarded "as reasoning from the general to a particular".

The deductive method of moving from the general assumption to the specific application is useful for solving problems. But it is not useful in arriving at new truths. The inductive process overcomes this limitation of deductive process.

Q. 6. What are the different areas of business research?

Ans. The branches of business research are as follows:

1. Management Research: It focuses on planning, organizing, staffing, communicating, co-ordinating, motivating. For example: A research study through correlation analysis of profit and dividend helps to predict and decide probable dividends for future years.

2. Accounting Research: Financial forecasts, break-even analysis, etc. are parts of Accounting Research. This is used as a basis for reports to management, shareholders, investors, tax authorities and other interested parties.

3. Marketing Research: Before a product is launched, the market research team of an organization, through a pilot survey, makes use of various techniques of statistics to analysis data on population, purchasing power, consumer behaviour, competitions and a hoard of other aspects.

Analysis of sales volume in relation to the purchasing power and concentration of population is helpful in establishing sales territories, routing of salesman, and advertising strategies to improve sales.

4. Personnel Management Research: In the process of manpower planning, a personnel department makes research studies of wage rates, incentive plans, cost of living, labour turnover rates, employment-trends, training and development programmes.

5. Research in Government Department: In the context of Government, research as a tool of economic policy has three distinct phases of operation, viz:

- (i) investigation of economic structure through continual compilation of facts;
- (ii) diagnosis of events that are taking place and the analysis of the forces underlying them; and the prognosis, *i.e.* the prediction of future development.

(iii) **Research in social sciences:** Research in social sciences is concerned both with knowledge for its own sake and with knowledge for what it can contribute to practical concerns.

Q. 7. What are the bases used for classifying research into different types?

Ans. Although any typology of research is inevitably arbitrary. Research may be classified crudely according to its major intent or the methods.

1. According to the intent: Research may be classified as:

(i) **Pure Research:** Pure research is undertaken for the sake of knowledge without any intention to apply it in practice.

(ii) **Applied Research:** Applied research is carried on to find solutions to a real-life problem requiring an action or policy decision. It is thus problem-oriented and action-directed.

(iii) **Exploratory Research:** Exploratory Research is preliminary study of an unfamiliar problem about which the researcher has little or no knowledge.

(iv) **Descriptive Research:** Descriptive study is a fact finding investigation with adequate interpretation. It is the simplest type of research.

(v) **Diagnostic study:** This is similar to descriptive study but with a different focus. It is directed towards discovering what is happening, why it is happening and what can be done about. It aims at identifying the causes of a problem and the possible solution for it.

(vi) **Evaluation studies:** It is made for assessing the effectiveness of social or economic programmes implemented or for assessing the impact of developmental projects on the development of the project area.

(vii) **Action Research:** It is concurrent evaluation study of an action programme launched for solving a problem for improving an existing situation.

2. According to the methods of study: Research may be classified as:

(i) **Experimental Research:** Experimental Research is designed to assess the effects of particular variables on a phenomenon by keeping the other variable constant or controlled.

(ii) **Surveys:** Survey is the 'fact-finding' study. It is a method of research involving collection of data directly from a population or a sample thereof at particular time.

(iii) **Case-study:** A case study is an in-depth comprehensive study of a person, a social group, an episode, a process, a situation, a programme, a community, an institution or any other social unit. Its purpose may be to understand the life-cycle of the unit under study or the interaction between factors that explain the present status or the development over a period of time.

Q. 8. List the various methods of research?

Ans. The various methods of research are:

1. Survey method
2. Observation method
3. Case method
4. Experimental method
5. Historical method
6. Comparative method.

Q. 9. Distinguish between Qualitative and Quantitative Data?

Ans. When any set of fact which is measurable and can be represented by numerical measurements then these facts are called quantitative data. For example, height of students in a college, income of persons in a locality, yield of wheat per acre etc.

Facts that are not measurable but we can feel the presence or absence of the characteristics are called qualitative data. Honesty, colour of hair and eyes, beauty, etc. are example of qualitative data.

Q. 10. What are the stages in the business research process?

Ans. The business research process involves the following stages:

1. Selecting a problem for business research:

This involves identification of a few problems and selecting one out of them, after evaluating the alternatives against certain selection criteria.

2. Formulation of the selected problem: The selected problem is defined and transformed into researchable questions.

3. Formulation of hypothesis: The propositions to be tested are set up.

4. Conceptualization: The concepts associated with the problem under study are operationally defined and measurement devices are designed.

5. Research plan or process: This plan covers all the aspects of the selected research work and serves as a blue-print for the endeavour.

Q. 11. Analyse the characteristics of Research?

Ans. Characteristics:

1. Research is a systematic and critical investigation into a phenomenon. Research is a purposive investigation. It is an organized inquiry search for facts should be made by scientific method rather than by arbitrary method.
2. It is not a mere compilation, but a purposeful investigation; it aims at describing; interpreting and explaining a phenomenon.
3. It adopts a scientific method.
4. It is objective and logical, applying possible tests to validate the measuring tools and the conclusion reached.
5. It is based upon observable experience or empirical evidence.
6. Research is directed towards finding answers to pertinent questions and solution to problems.

7. It emphasizes the development of generalization, principles or theories.

8. The purpose of research is not to arrive at answer, which is personally pleasing to the researcher, but rather only which will stand up the test of criticism.

Q. 12. Define the term science and distinguish it from knowledge?

Ans. Science is a body of systematized knowledge. It studies cause and effect and tries to find out generalizations which are called law of that science. It does not tell whether the result are good or bad. It only describes what are the facts. It is like a light house that gives light to the ships to find out their own ways but does not indicate in which direction they should go.

Knowledge means the state of knowing about a particular fact or situation. Knowledge has something to do with knowing. Knowing may be through acquaintance or through the description of the characteristics of certain things and science means knowledge about the structure and behaviour of the natural and physical world based on facts that you can prove, for example by experiment.

Knowledge and science are not necessarily having the same meaning. Science implies knowledge but the converse is not true.

Q. 13. Explain the significance of business research?

Ans. The role of research in several fields of applied economics, whether related to business or to the economy as a whole, has greatly increased in modern times.

Research has its special significance in solving various operational and planning problems of business and industry. Operation research and market research, along with motivational research are considered crucial and their results assists in more than one way, in taking business decision.

1. Market Research: Market research is the investigation of structure and development of a market for the purpose of formulating efficient policies for purchasing, production and sales. The purchase department uses research to frame alternative suitable policies regarding where to buy, when to buy, how much to buy and at what price to buy. In production department, product development, new and better way of producing goods, invention of new technology etc., are some of the prominent area of research problems and opportunities in the market, product preference,